EIA-DAR Field Test, Audio Test Segments

TR.	DESCRIPTION	START	STOP	RUN TIME
ALL	- -	00:00:00:00	01:02:29:03	01:02:29:04
1	KEIA STATION I.D.	00:00:00:00	00:00:42:10	00:00:42:11
2	SOFT ROCK VOCAL	00:00:43:11	00:02:50:08	00:02:06:28
3	LT. ROCK - C&W/BLUES	00:02:51:08	00:04:56:10	00:02:05:03
4	EFFECTS + HEAVY INST. & VOCAL	00:04:57:10	00:07:05:25	00:02:08:16
5	SLOW START - INST. & VOCAL	00:07:06:26	00:09:16:11	00:02:09:16
6	GUITAR & VOCAL	00:09:17:12	00:11:24:04	00:02:06:23
7	CLASSICAL GUITAR TO HEAVY ROCK	00:11:25:04	00:13:32:27	00:02:07:24
8	SYNTH. EASTERN TO ROCK	00:13:33:29	00:14:45:15	00:01:11:17
9	SYNTH. & PERCUSSION	00:14:46:15	00:16:52:25	00:02:06:11
10	FEMALE VOCAL BALLAD, JAZZ	00:16:53:25	00:19:01:07	00:02:07:13
11	INDIANA JONES - POPS.	00:19:02:07	00:21:10:04	00:02:07:28
12	BAND MARCH	00:21:11:05	00:22:41:20	00:01:30:16
13	CLASSICAL - LIKE BOLERO	00:22:42:20	00:24:50:23	00:02:08:04
14	JAZZ-SYNTH / STRONG BEAT	00:24:51:24	00:26:57:25	00:02:06:02
15	OPERA / FUNICULI FUNICULA	00:26:58:25	00:29:04:24	00:02:06:00
16	KEIA STATION I.D.	00:29:05:25	00:29:47:23	00:00:41:29
17	SOFT POP	00:29:48:23	00:31:56:00	00:02:07:08
18	SYNTH. - LATIN - VOCAL	00:31:57:00	00:34:05:13	00:02:08:14
19	LATIN - INST.	00:34:06:13	00:36:13:24	00:02:07:12
20	ORCHESTRAL - MOZART	00:36:14:24	00:38:20:22	00:02:05:29
21	SYNTH. - FEMALE VOCALS	00:38:21:22	00:40:16:22	00:01:55:01
22	SYNTH. - SOFT INSTRUMENTAL	00:40:17:23	00:45:19:08	00:05:01:16
23	CLASSICAL ORCHESTRAL	00:45:20:08	00:48:59:25	00:03:39:18
24	ACAPELLA VOCAL - S. VERA	00:49:00:25	00:51:05:21	00:02:04:27
25	VOCAL - FEMALE LITE ROCK	00:51:06:22	00:55:01:10	00:03:54:19
26	ORCHESTRAL - POPULAR	00:55:02:10	00:59:04:26	00:04:02:17
27	INSTRUMENTAL - SYNTH & GUITAR	00:59:05:26	01:02:29:02	00:03:23:07

INDEX PAGE - APPENDIX B

Note: Specific route maps included with appropriate route data graphs.

"Long Path" Test Routes

General Information

Described below are revised long path test routes. The chosen starting points are arbitrary, as are the directions of travel around the loops, although they were chosen in some cases for best anticipated traffic flow. Traffic patterns or road conditions occasionally necessitated minor revisions to the actual routes driven.

The path of each route is described below and shown graphically on attached Figure 2, while route landmarks and RF environment designators are described in Figure 3. Figure 4 is a grid that compares some of the terrain characteristics of each route. Estimated driving times shown below do not consider traffic delays.

Specific Route Descriptions

Route P - San Francisco Perimeter: Begin just south of Golden Gate Bridge on Highway 101; take Highway 1 (19th Avenue) exit south through Golden Gate Park, continuing south to Brotherhood Way; take Brotherhood Way east to I-280 north; transition to Highway 101 north; transition to I-80 east; take I-80 east to 4th Street (last San Francisco exit); at end of exit ramp, turn left on Bryant Street to The Embarcadero; turn left on The Embarcadero and travel into Wharf area; turn left on Bay Street at Pier 31; turn right onto Laguna Street; travel two blocks to Marina Boulevard (Marina District); turn left onto Marina Boulevard, which becomes Highway 101 north. Approximate driving time: 45 minutes

Route D - San Francisco Downtown: Begin at easternmost end of Market Street; take Market Street southwest; transition to Portola Avenue, then to Woodside Avenue; at the end of Woodside Avenue, turn right on Laguna Honda at Dewey; take next right onto Clarendon; travel up Clarendon, which becomes Twin Peaks Boulevard, Clayton Street, then Ashbury Street; turn right on Frederick Street; travel two blocks to Masonic Avenue; turn left on Masonic Avenue and travel to Bush Street; turn left after one block onto Presidio Avenue; turn right after two blocks onto California Street; take California Street east to Sansome Street; take Sansome Street north to Jackson Street; take Jackson Street east to Battery Street; take Battery Street south to Pine Street; take Pine Street west to Sansome Street; take Sansome Street north to Jackson Street; take Jackson Street east to Battery Street; take Battery Street south to Market Street. Approximate driving time: 1 hour

Route W - San Francisco Peninsula: Take I-280 to Highway 1 south, near Pacifica; continue south on Highway 1 along coast to Half Moon Bay; turn left on Highway 92, heading east, crossing under I-280 to Highway 101; take Highway 101 north to I-380, then I-380 west to I-280 north, back to the starting point. Approximate driving time:
1 hour, 15 minutes

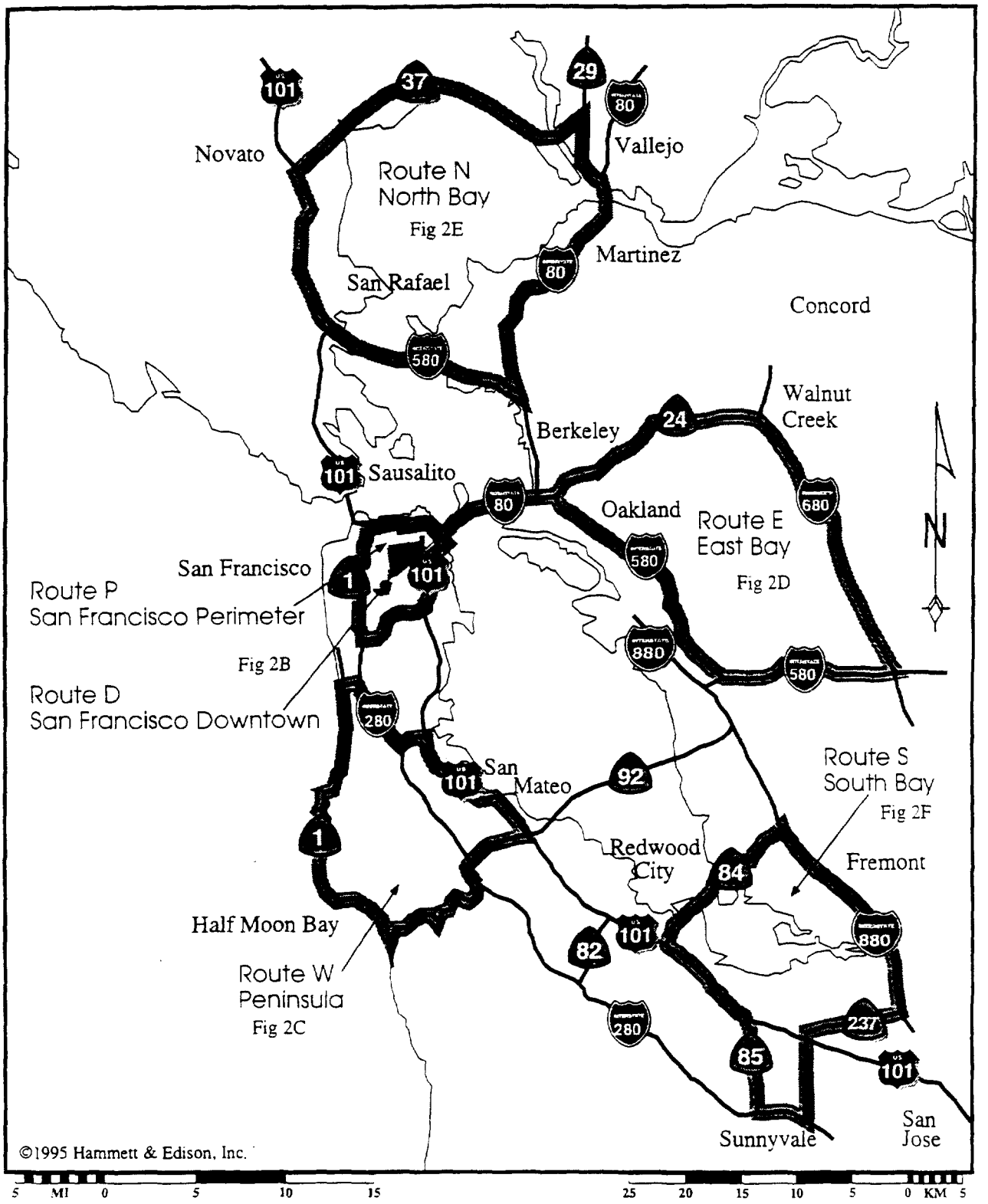
"Long Path" Test Routes

Route E - East Bay: Begin on I-80 at San Francisco side of Bay Bridge; cross bridge (lower deck) to I-580; take I-580 east to Highway 24; take Highway 24 east to I-680; take I-680 south to I-580, near Dublin; take I-580 west to Bay Bridge (Oakland side); cross bridge (upper deck) and end on San Francisco side. Approximate driving time:
1 hour

Route N - North Bay: Begin at junction of Highway 101 and I-580 in San Rafael; take Highway 101 north to Highway 37; take Highway 37 east to Highway 29 south; connect to I-80 in Vallejo, then south to Central Avenue west, one block to I-580 west; take I-580 west across the Richmond Bridge; transition to Highway 101. Approximate driving time: 1 hour, 15 minutes

Route S - South Bay: Begin at junction of Highway 101 and Highway 84 (Dumbarton Bridge exit) east; cross Dumbarton Bridge to Fremont, then travel south on I-880; transition to Highway 237; take Highway 237 west to Lawrence Expressway (also known as County Road G2); take Lawrence Expressway south to I-280; take I-280 north to Highway 85 north; take Highway 85 north to Highway 101 north, back to Dumbarton Bridge exit. Approximate driving time: 1 hour

"Long Path" Test Routes



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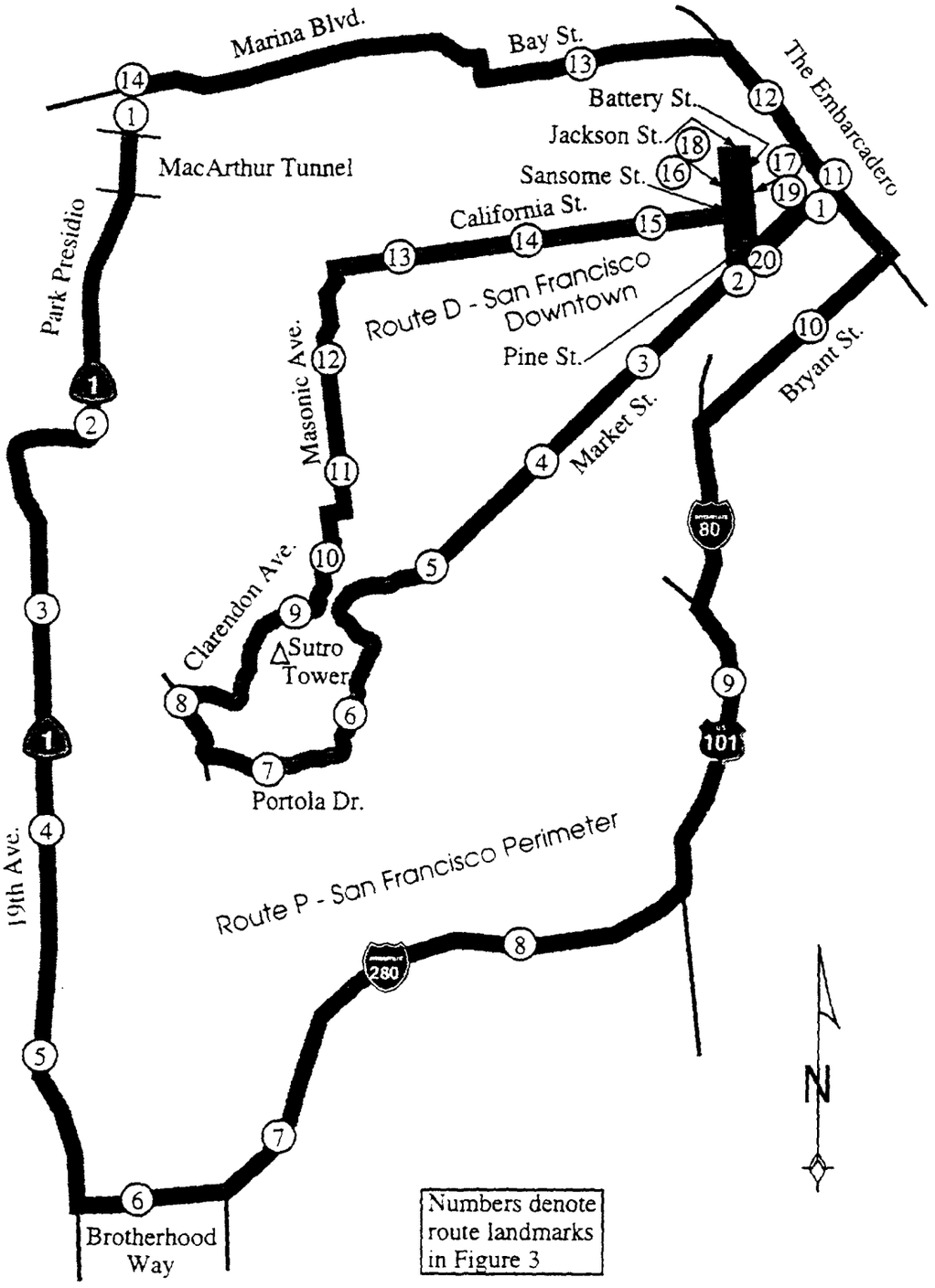
"Long Path" Test Routes

Routes D & P • San Francisco



HAMMETT & EDISON, INC.
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SAN FRANCISCO

961210
Figure 2B

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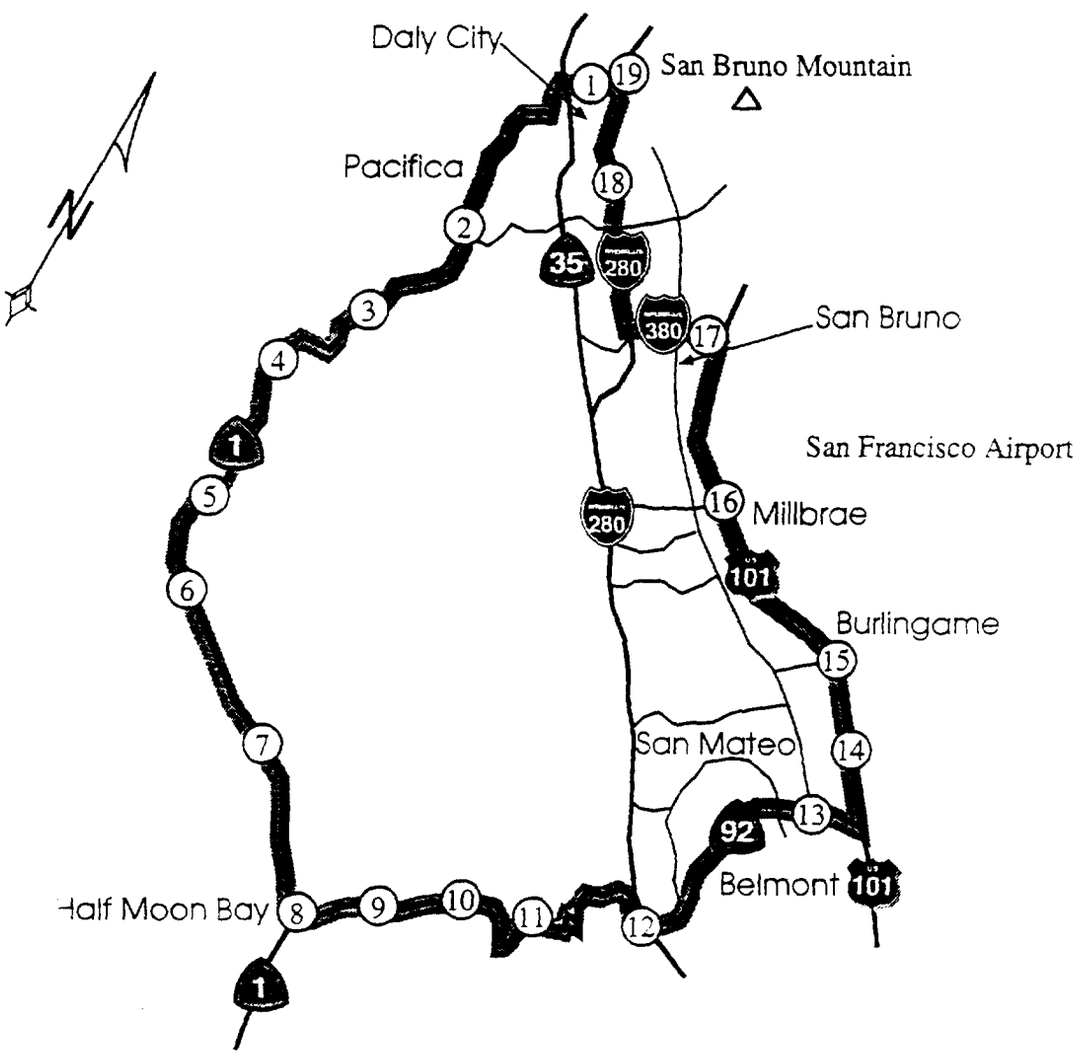
"Long Path" Test Routes

Route W • San Francisco Peninsula



Numbers denote route landmarks in Figure 3

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Figure 2C

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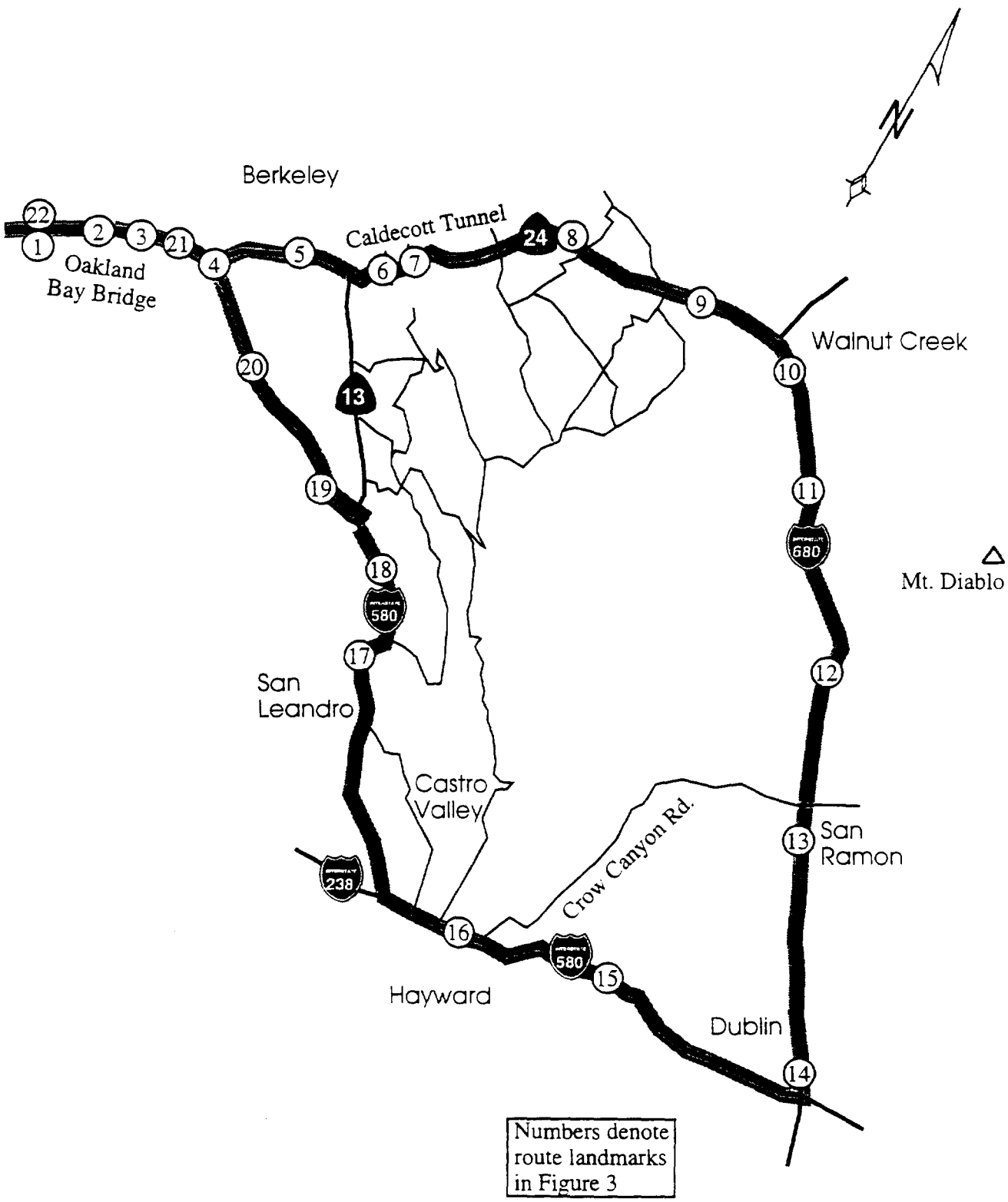
"Long Path" Test Routes

Route E • East Bay



Numbers denote route landmarks in Figure 3

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Figure 2D

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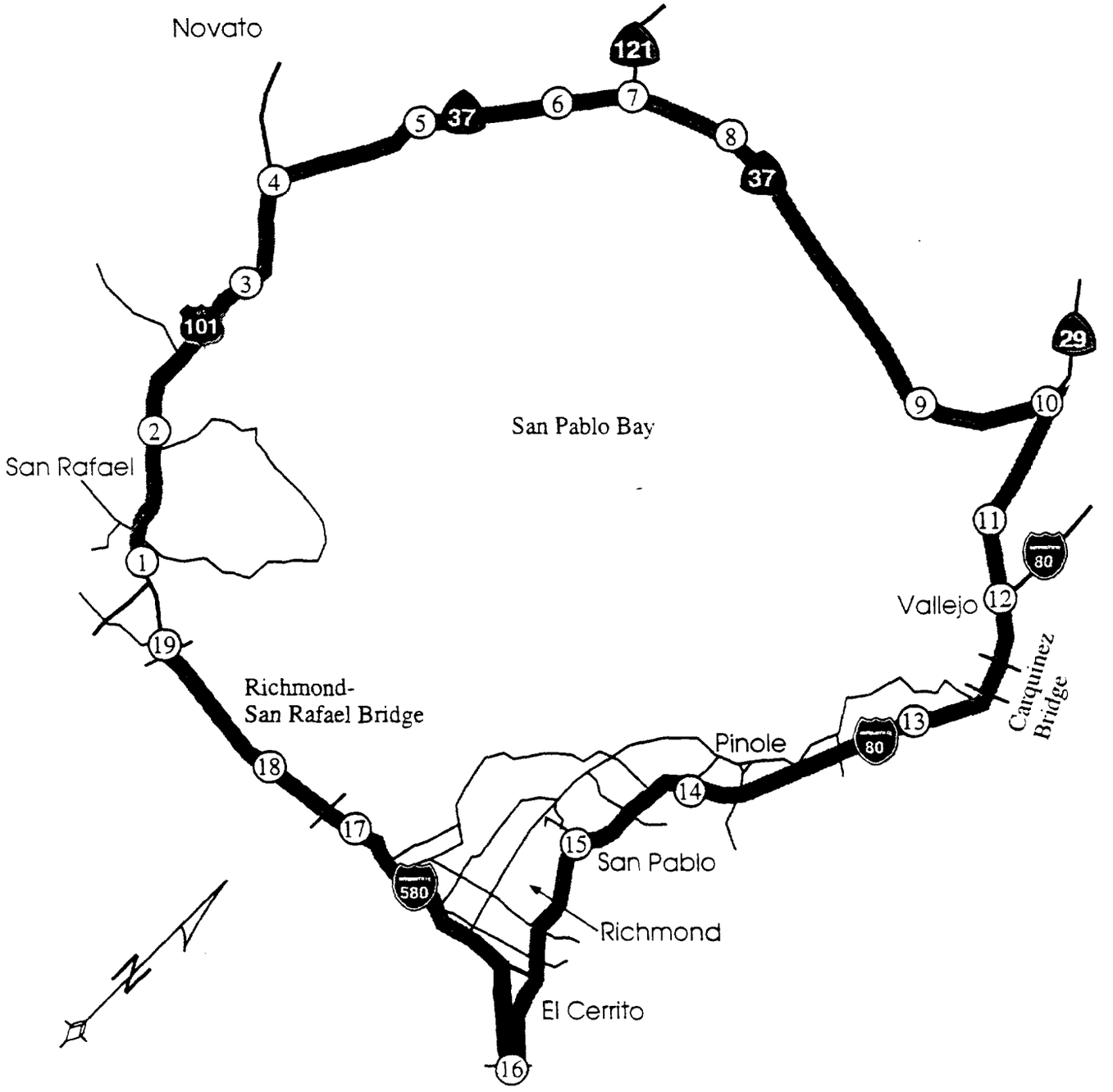
"Long Path" Test Routes

Route N • North Bay



Numbers denote route landmarks in Figure 3

HAMMETT & EDISON, INC.
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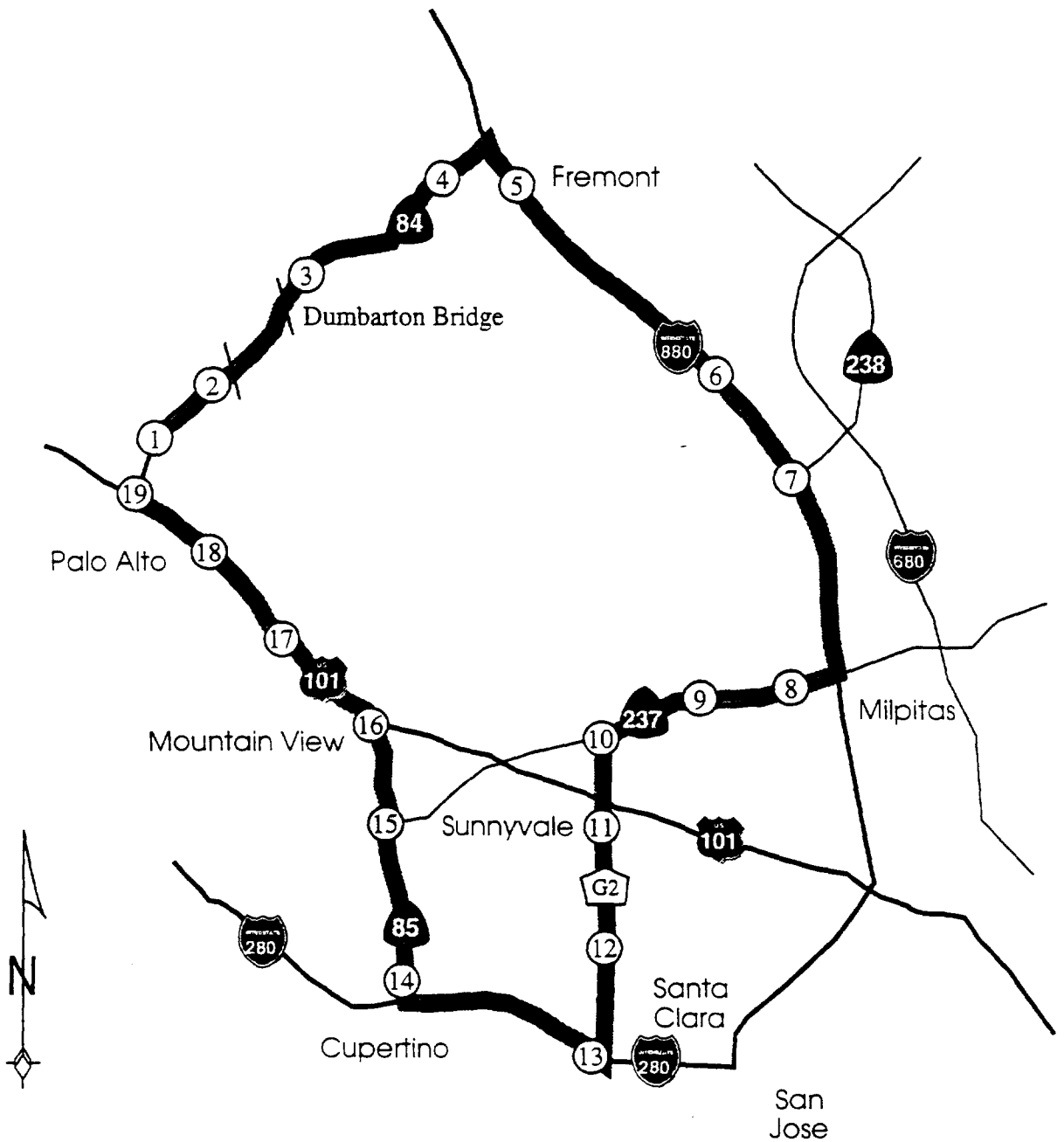
961210
Figure 2E

"Long Path" Test Routes
Route S • South Bay



Numbers denote route landmarks in Figure 3

"Long Path" Test Routes
Landmark Descriptions

Route P

Landmark Number	Environment Designator	Landmark Description
1	FSD	Call box on 19th before tunnel
2	HSD	Intersection of 19th & Fulton
3	HSL	Intersection of 19th & Noriega
4	HSL	Intersection of 19th & Vincente
5	FUM	Intersection of 19th & Holloway
6	FUM	Arch stop light
7	FUL	Stop light under BART tracks before 280 onramp
8	HUL	"I-280 Downtown" sign at Alemany exit
9	FUL	"I-80 Bay Bridge/Downtown" sign on overpass
10	HUL	2nd Street stop light
11	FUL	Clock tower at World Trade Center
12	FUM	Stop light at Battery
13	HUL	Stop light at Columbus & Bay
14	END	"19th Avenue Exit" sign

Route D

1	FDL	Left turn on Market from Steuart (center of intersection)
2	FDL	"American Savings Bank" blue and white sign on building
3	FDL	Red and White Levi's "House of Blue Jeans" sign on building past 5th
4	HDL	Central Skyway (Hwy 101) overpass
5	HUM	Intersection of Castro, 17th and Market
6	HUM	Pedestrian overpass after Argent and Market
7	HUD	Right turn on Woodside Avenue
8	HSD	Blank yellow diamond sign at right turn on Clarendon
9	HUM	Mailbox past intersection of Clarendon and Twin Peaks
10	HUM	"15 MPH" turn sign at corner of Clifford Terrace and Ashbury
11	HUM	"No Left Turn 4-7pm Everyday" sign at Fell and Masonic
12	FUL	"Recycling Center" sign at Anza/O'Farrell and Masonic
13	HUL	Stop light at intersection of Scott and California
14	HUL	"Trucks use Van Ness Avenue" sign at California and Gough
15	HDL	Blue and White "Parking" sign marking garage at California and Taylor
16	FDL	Federal Reserve Bank of SF after Sacramento and Sansome (statue) (1st)
17	FDL	Pedestrian walkway over Battery Street before Sacramento (1st)
18	FDL	Federal Reserve Bank of SF after Sacramento and Sansome (statue) (2nd)
19	FDL	Pedestrian walkway over Battery Street before Sacramento (2nd)
20	END	Entrance to intersection of Market and Battery

"Long Path" Test Routes
Landmark Descriptions

Route W

Landmark Number	Environment Designator	Landmark Description
1	HSM	I-280 to Hwy 1 South—Clarinada Blvd exit sign
2	HSM	"End Freeway" sign at Sharp Park Blvd
3	MRD	Linda Mar Drive stop light
4	MRM	Devil's Slide winding road (S) sign
5	HSM	Montara Chart House restaurant
6	FSM	Half Moon Bay/San Mateo Airport entrance sign
7	FSM	Gin Wan Chinese restaurant
8	VSD	Junction of Hwy 1 & Hwy 92 east
9	VRD	"Obester Winery" sign
10	MRM	"Lombardi Spring" well sign
11	MRD	"S" Sign after Hwy 35 junction
12	HSM	I-280 overcrossing at 92—280 north sign at onramp
13	FUM	"El Camino Real North/South" sign
14	FUM	"3rd Ave Next Right" sign
15	FUL	Peninsula Ave overpass
16	FUL	Millbrae Ave overpass
17	FSM	"San Bruno/El Camino Real" exit sign after 380 onramp
18	HSM	"Daly City" city limit sign
19	END	"Hwy 1 Pacifica/Mission Street Exit" sign

Route E

1	FBN	"50 MPH" sign immediately after last SF entrance to I-80 (Battery)
2	FBN	"15 MPH" sign with U-shaped arrow at entrance to tunnel
3	FUL	Hwy 80/580/680 direction sign immediately after bridge
4	FUL	"Walnut Creek 24" sign at end of entrance ramp
5	HSM	"Tunnel Road 1 1/2 mi" sign
6	FTN	Entrance to Caldecott Tunnel
7	HRM	End of Caldecott Tunnel
8	HRD	"St. Stephens Road/Hidden Valley Road Next Exit" sign
9	HRM	"Pleasant Hill Rd 1 mi/Jct 680 2 1/4 mi" sign
10	HRM	"So Main Street Next Exit" sign
11	HRM	"Stone Valley Road East/West" sign
12	FRM	Overpass after Sycamore Valley Road exit
13	FRM	Overpass with "Bollinger Canyon Road Next Exit" sign
14	HRM	"Oakland/Stockton 580" sign above beginning of onramp to 580
15	HRM	"Eden Canyon Road/Palomares Road 3/4 mi" sign
16	HSM	"Castro Valley Next Right" sign
17	HSM	"Oakland Zoo-Park/Oakland Airport Next Right" sign
18	HSD	Large green water tank on hill immediately past Keller Avenue exit
19	FSM	Overpass with "Coolidge/Fruitvale Avenue" and "Bay Bridge" signs
20	FUM	Overpass with "Lakeshore/Grand Avenue/Harrison Street" sign
21	FBN	"Toll Crossing 1/2 mi Auto Toll $1.00" sign
22	END	Railing over west end of Bay Bridge

"Long Path" Test Routes
Landmark Descriptions

Route N

Landmark Number	Environment Designator	Landmark Description
1	HUM	Central San Rafael Exit sign (north end of exit lane)
2	HSM	Frank Lloyd Wright Building at Marin Center Sign
3	HSM	Alameda del Prado overpass
4	FRM	Intersection of Highway 101 and Highway 37, double arrow sign
5	FRL	Marin/Sonoma County line on Bridge
6	FRL	Lakeville Highway stop light
7	FRL	Highway 121 stop light
8	FRL	"Solano County Line" sign
9	FSL	"Welcome to Vallejo" sign
10	HUM	Intersection of Highway 37 and Highway 29 at "T" sign
11	HSM	Veer left at Curtola Pkwy
12	HSM	"I-80 Freeway Entrance" sign
13	HEM	"Hercules Next Two Exits" sign
14	HSM	First Appian Way overpass
15	HSM	"San Pablo City Limit" sign
16	HSM	"Freeway Entrance" sign at onramp to 580 north from Central Avenue
17	FBN	"Toll Crossing Entrance 1/4 Mile" sign
18	FBN	"Marin County Line" sign on bridge
19	END	I-580 and Highway 101/Exit sign for Sir Francis Drake

Route S

1	FSM	"Sun Microsystems" sign at intersection of 84 and Willow
2	FBN	"Dumbarton Bridge Toll Crossing Entrance" sign
3	FRL	South KGO tower (closest to 84)
4	FSM	Overpass with "Newark Blvd/Ardenwood Blvd Next Right" sign
5	FSM	Railroad overcrossing past Thornton Avenue exit
6	FSL	Overpass after Auto Mall Parkway exit
7	FSL	Overpass with "Dixon Landing Road 1 3/4 mi" sign
8	FSL	Overpass with "McCarthy Blvd/Ranch Dr" sign past McCarthy Ranch mall
9	FSL	Overpass past North First Street exit
10	FSM	Hwy 237/Milpitas Freeway Entrance sign on Lawrence Expwy (overpass)
11	FSM	"Fry's Electronics" sign on Lawrence
12	FSM	"El Camino Real Right Lane" sign on Lawrence
13	FSM	"North 280 Freeway Entrance" sign
14	FSM	Overpass with "Fremont Ave/Los Altos 3/4 mi" sign on 85
15	FSM	"Mountain View City Limit" sign on 85
16	FSM	North 101 San Francisco" sign at Moffett Blvd exit
17	FSM	Overpass after San Antonio Road exit/Palo Alto city limit
18	FSM	"East Palo Alto City Limit/San Mateo County Line" signs
19	END	"Willow Rd/Fremont East 84" sign

"Long Path" Test Routes
Landmark Descriptions

RF Environment Designators

RF Environment Designators are three-letter codes representing typical landscape features encountered along each section of a long path test route. The code associated with each landmark pertains to the segment of the route beginning at that point and continuing to the next mark; for the last landmark on a path the designator "END" is always used. Where one path section contains very different landscape features, the codes denoting features typical of the majority of that section are used. The codes used are as follows:

First Letter - Terrain

F	Flat	Little or no change in elevation
H	Hilly	Gradual changes in elevation
M	Mountainous	Steep changes in elevation
V	Valley	Roadway between regions of consistently greater elevation

Second Letter - Urbanization

R	Rural	Open space with occasional buildings typically less than 3 stories tall
S	Suburban	Some space between buildings typically less than 3 stories tall
U	Urban	Many closely-spaced buildings less than 10 stories tall
D	Dense	Many closely-spaced buildings 10 stories tall or greater
B	Bridge	No urbanization; roadway above water
T	Tunnel	No urbanization; roadway underground

Third Letter - Foliage

N	None	No foliage; roadway above water or underground
L	Light	Grasses and low bushes, occasional short trees
M	Moderate	Bushes and stands of short trees, occasional tall trees
D	Dense	Many closely-spaced, tall trees

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"Long Path" Test Routes - Qualitative Information

The long path test routes described in Figures 1 and 2 were selected to allow system evaluation under differing terrain and line-of-sight conditions. Described below are some of the qualitative characteristics of each proposed route.

Route P - San Francisco Perimeter: This route circles virtually the entire City of San Francisco. It includes travel on popular commute routes and through popular tourist areas. The northern part of the route is line-of-sight with the Mt. Beacon transmitter site, while the southern part of the route is shielded by terrain. The northeastern part of the route, that on I-80, is shielded in part by tall city buildings. The western part of the route travels through city residential areas, through the MacArthur Tunnel, and through Golden Gate Park.

Route D - San Francisco Downtown: The San Francisco downtown route covers central parts of San Francisco, including both downtown city and nearby residential areas. All of Market Street is covered, which includes travel between tall buildings and under trolley power cables in the city area, and up commonly traveled mountain roads in the residential areas near Mt. Sutro and Twin Peaks. The route also includes travel through the Financial District, the low-rise Haight-Ashbury District, and up and down travel on the hills of California Street, which is shared in part with cable car traffic.

Route W - San Francisco Peninsula: The Peninsula route (western Bay Area) covers parts of the heavily traveled Route 101 and I-280 corridors, as well as the San Mateo County coastline. Travel on Highway 92 is included; this two-lane road is a popular commute route that connects residential Half Moon Bay with San Mateo. It winds up and down hills, and much of it is terrain-shielded to the Mt. Beacon transmitter site (and the other L-band transmitter sites, as well).

Route E - East Bay: The East Bay route includes travel on both the upper and lower decks of the Bay Bridge, which is the major link between San Francisco and Oakland. Travel is also included along Highway 24 and I-680. Highway 24 travel includes the Caldecott Tunnel, east of which is shielded from most Bay Area FM stations. Most of I-680 is also heavily terrain shielded. A large number of residential communities are located immediately adjacent to Highway 24, I-580, and I-680. The route includes travel immediately east of Oakland, along Highway 580.

Electronic Industries Association

"Long Path" Test Routes - Qualitative Information

Route N - North Bay: This route includes both line-of-sight (over the San Francisco and San Pablo Bays) and terrain-shielded areas. The part of the route that includes travel on I-80 and I-580 is nearly all line-of-sight to Mt. Beacon, while some travel on parts of Highways 101 and 37 is terrain-shielded. As with the Peninsula route, residential areas are adjacent along many parts of the route. Travel across two major bridges is included.

Route S - South Bay: This route is nearly all over flat terrain and on well-established roads and major commute highways. Line-of-sight conditions exist over most of the route; such propagation is all over water, consisting of almost the entire length of the San Francisco Bay. Travel also includes the heart of the Silicon Valley area, through Sunnyvale. As with the other routes, residential areas are adjacent, especially along the Lawrence Expressway. Travel across the Dumbarton Bridge is included in the route. The southernmost part of this route is sometimes considered to be a fringe coverage area for the FM stations on Mt. Beacon.

Some of the key qualitative characteristics of each route are summarized in the table below:

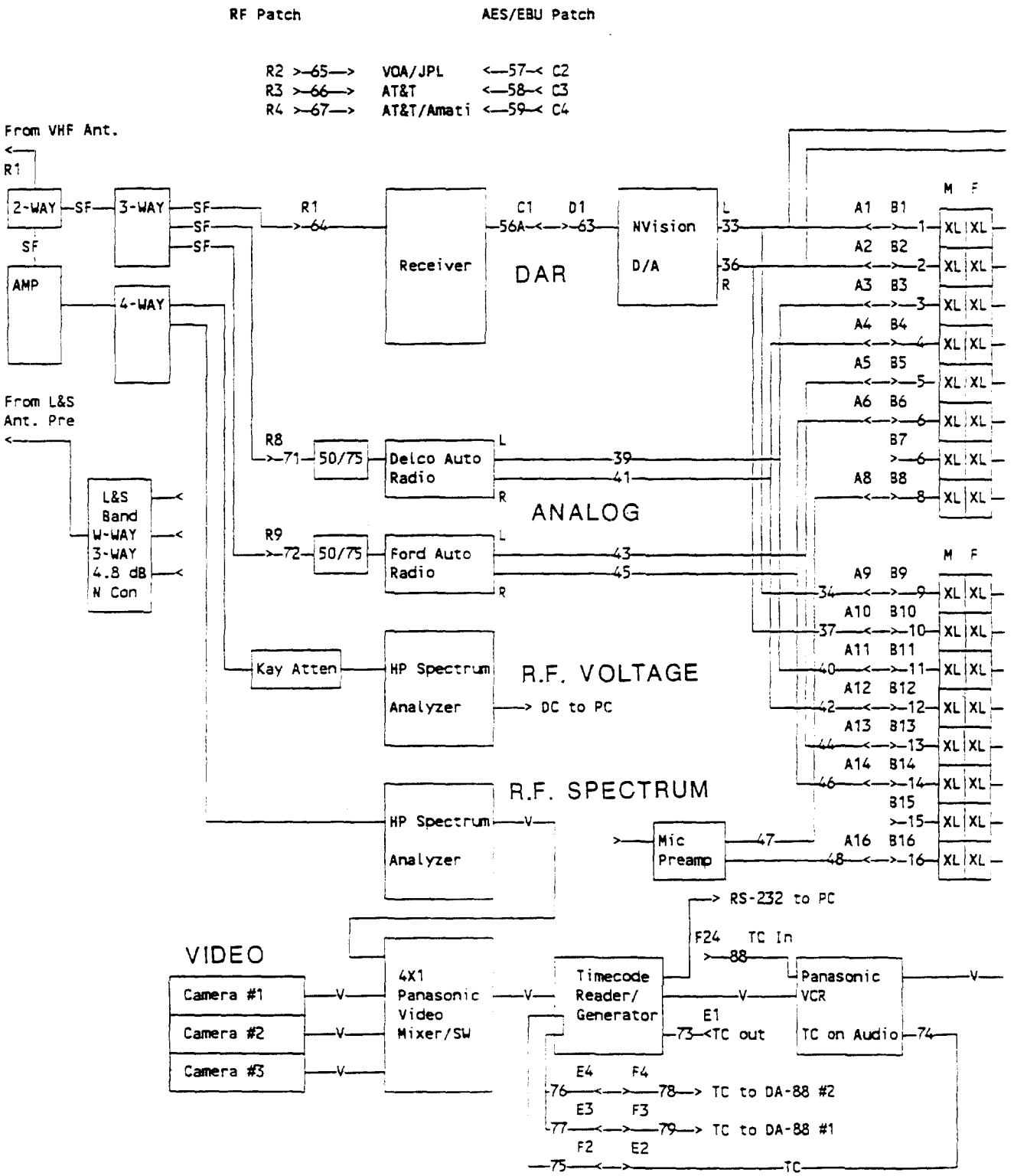
Qualitative Characteristic	Route P	D	W	E	N	S
A. Some line-of-sight conditions exist	✓	✓	✓	✓	✓	✓
B. Terrain shielding conditions exist	✓	✓	✓	✓	✓	✓
C. Significant shielding by buildings	✓	✓		✓		✓
D. Vertical shielding (tunnels/wires)	✓	✓		✓		
E. Major over-water path	✓	✓		✓	✓	✓
F. Travel along waterfront areas	✓		✓	✓	✓	✓
G. Significant foliage along part of path	✓	✓	✓	✓		
H. Rural area(s) covered			✓		✓	
J. Primarily highway travel				✓		✓
K. Residential areas covered/directly adjacent	✓	✓	✓	✓	✓	✓
L. (More) residential areas optional			✓	✓	✓	✓
M. "Fringe" FM reception area			✓	✓		✓
N. Co-channel interferers (IBAC only)[1]	✓	✓	✓	✓	✓	✓
O. Adjacent-channel interferers (IBAC only)[2]	✓	✓			✓	

[1] KSEG, Sacramento, and KWAV, Monterey (both 96.9 MHz).

[2] KLLC, 97.3 MHz, San Francisco, and KOIT, 96.5 MHz, San Francisco.

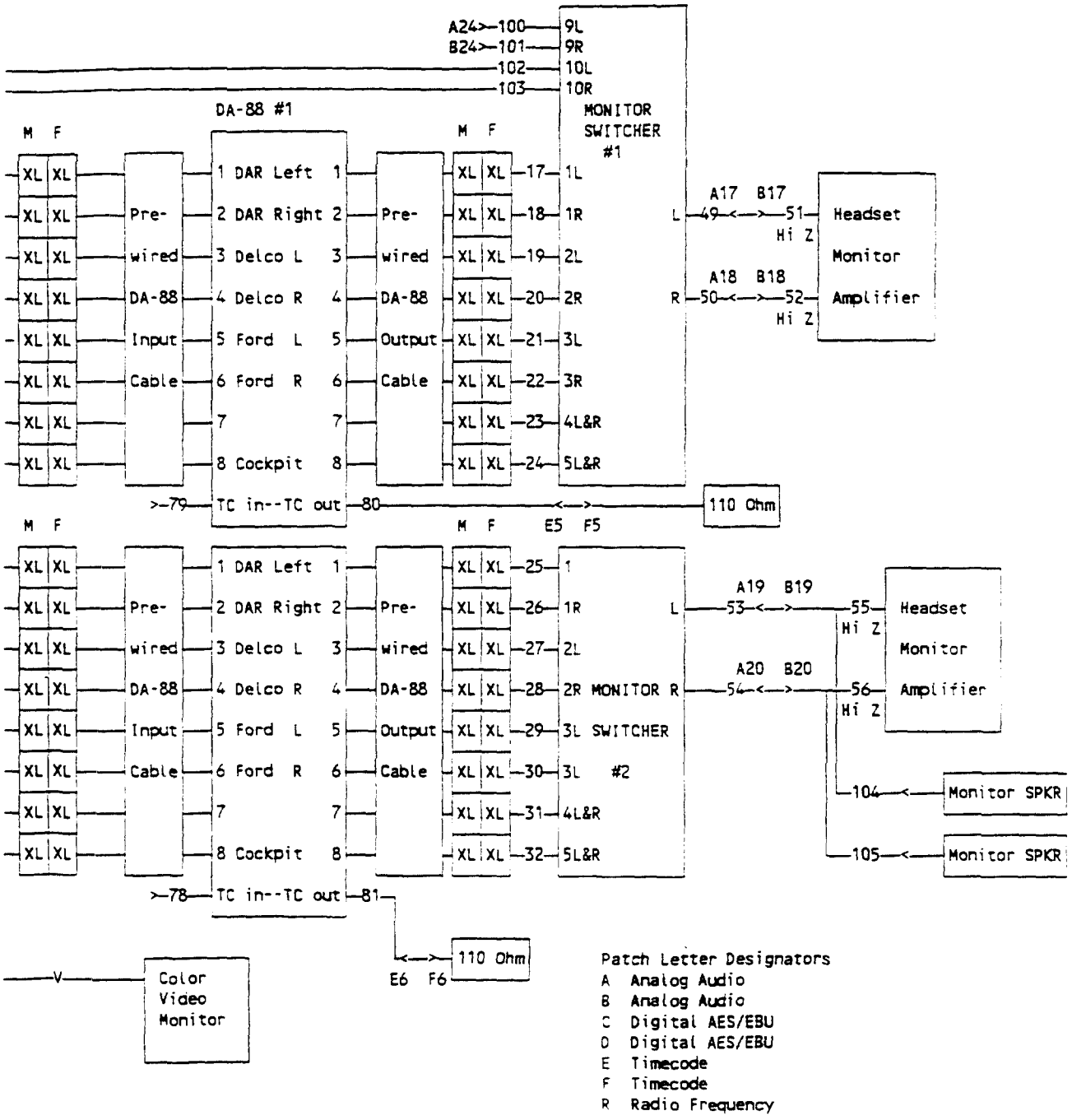
INDEX PAGE - APPENDIX C

Field Test R.F. testbed data



EIA-DAR FIELD TEST; TESTBED BLOCK DIAGRAM

R.F. SECTION (DETAIL)



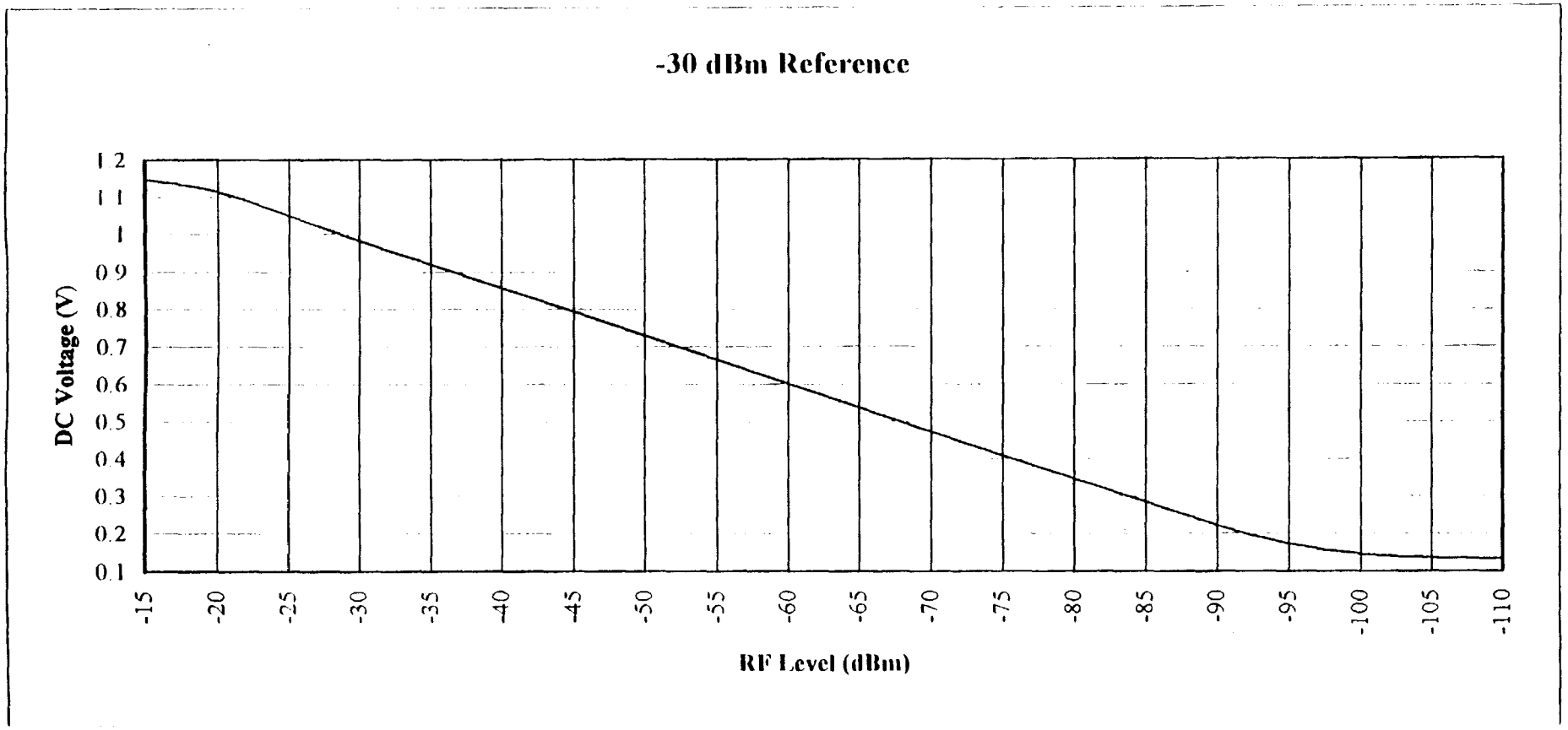
EIA-DAR FIELD TEST; TESTBED BLOCK DIAGRAM

AUDIO SECTION (DETAIL)

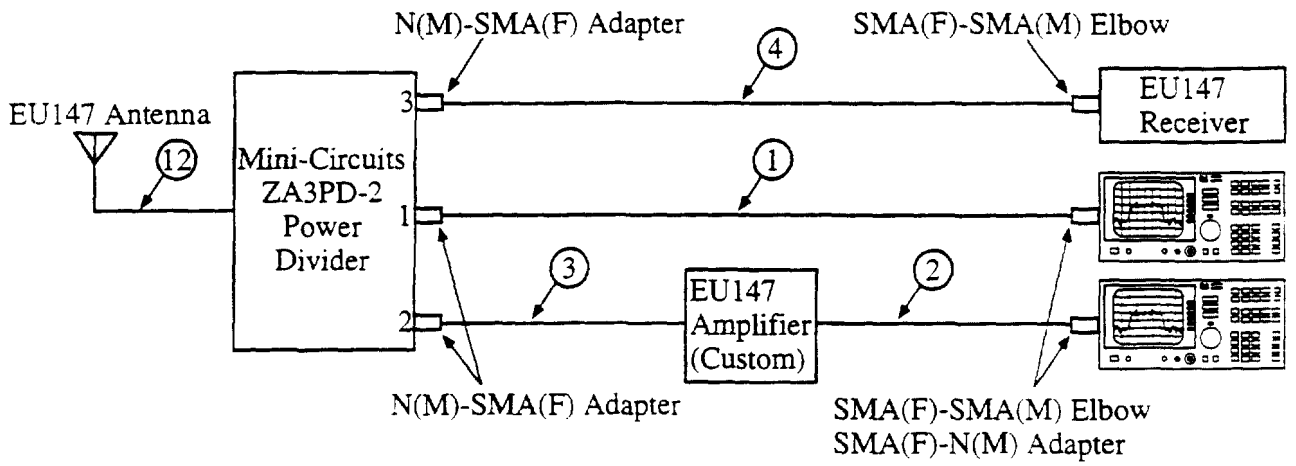
Digital Radio Test Laboratory

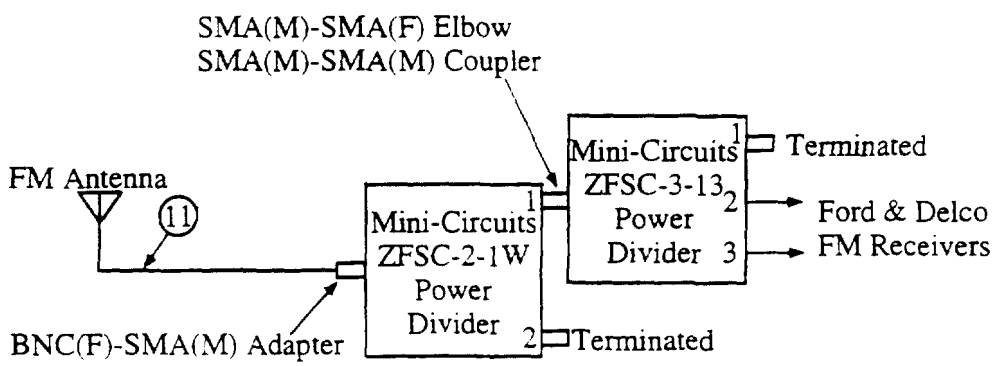
-30 dBm Ref		AT&T
-15	1.148	
-20	1.114	
-25	1.049	
-30	0.982	0.950
-35	0.921	
-40	0.857	0.822
-45	0.793	
-50	0.729	0.694
-55	0.666	
-60	0.601	0.566
-65	0.538	
-70	0.473	0.438
-75	0.410	
-80	0.346	0.315
-85	0.284	
-90	0 222	0.234
-95	0.173	
-100	0.146	
-105	0.136	
-110	0.133	

Digital Radio Test Laboratory

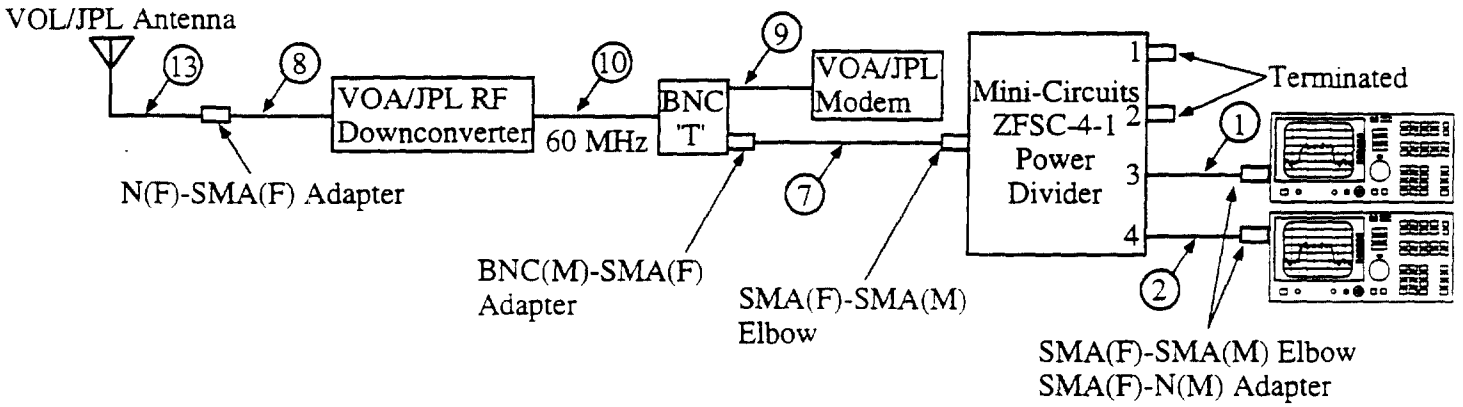


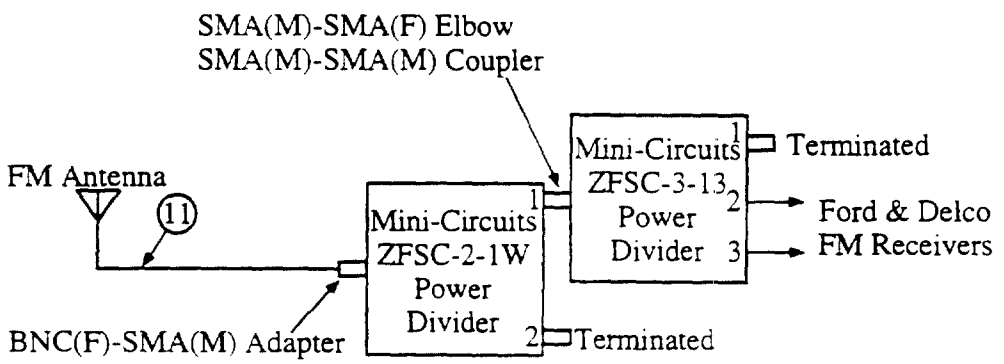
DAR RF Test Bed Configuration
Eureka 147 System



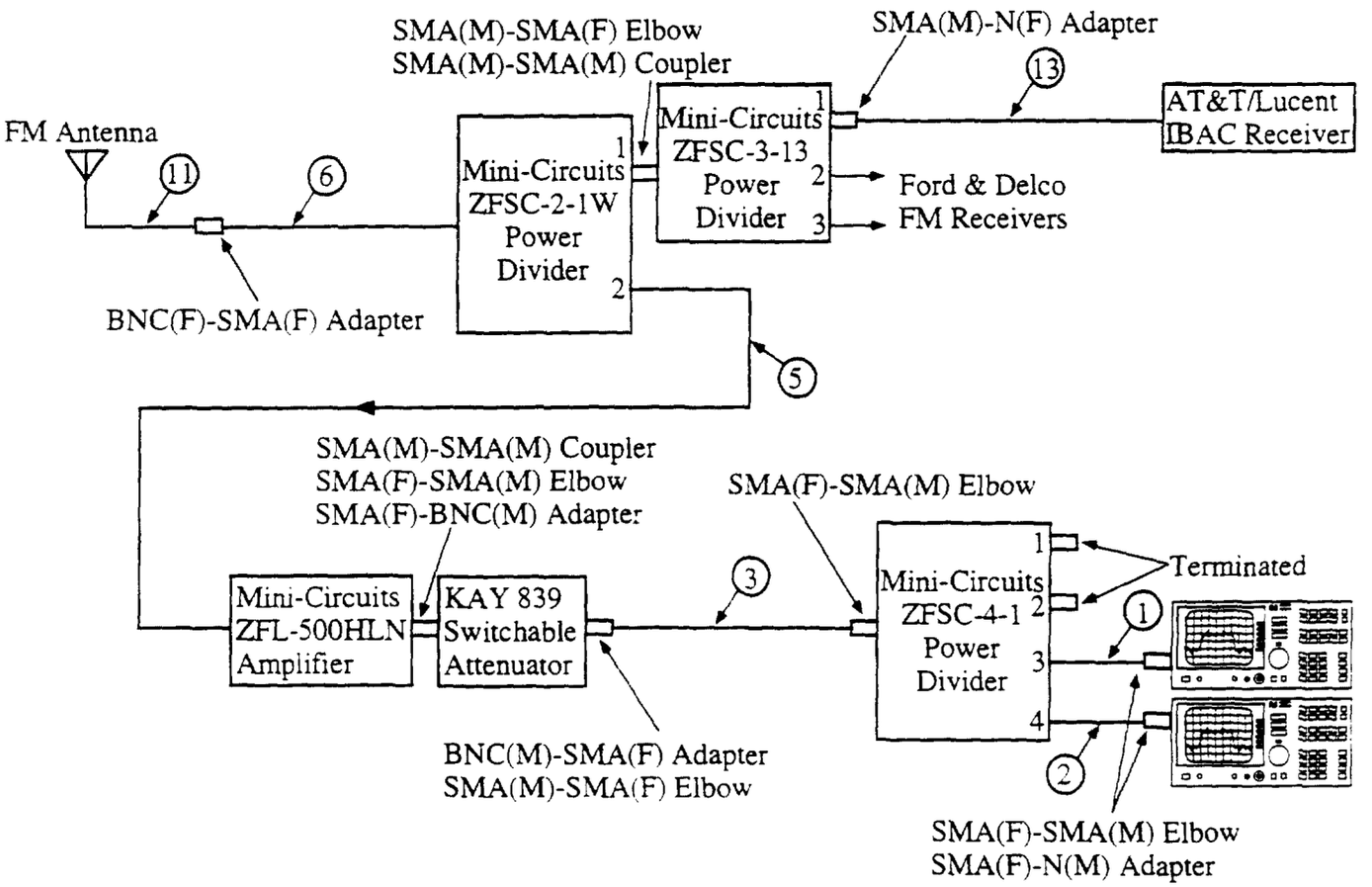


DAR RF Test Bed Configuration
VOA/JPL System





DAR RF Test Bed Configuration
AT&T/Lucent IBAC System



DAR RF Test Bed Components

Cables

No.	Description	Length	Loss VHF	Loss L-Band	Loss S-Band
1	QMI metal shielded semi-rigid coax SMA(M)-SMA(M)	36 in	0.45 dB	0.65 dB	—
2	QMI metal shielded semi-rigid coax SMA(M)-SMA(M)	36 in	0.45	0.65	—
3	QMI metal shielded semi-rigid coax SMA(M)-SMA(M)	12 in	0.19	0.26	—
4	QMI metal shielded semi-rigid coax SMA(M)-SMA(M)	18 in	—	0.36	—
5	QMI metal shielded semi-rigid coax SMA(M)-SMA(M)	18 in	0.26	—	—
6	QMI metal shielded semi-rigid coax SMA(M)-SMA(M)	18 in	0.26	—	—
7	M17/60-RG142 MIL-C-17G 12814 THERMAX SMA(M)-SMA(M)	36 in	0.09	—	—
8	SWC 507-142B RG142B/U SMA(M)-SMA(M)	11.5 in	—	—	0.24
9	RG59/U type CL2 22 AWG BNC(M)-BNC(M)	19 in	0.04	—	—
10	VOA/JPL coax signal cable BNC(M)-SMA(M)	15.5 in	0.03	—	—
11	Tandy Wire & Cable Type RG-58/U BNC(M)-BNC(M)	16 ft	0.72	—	—
12	Belden Type 9914 RG-8 N(M)-N(M)	8 ft	—	0.53	—
13	Belden Type 9914 RG-8 N(M)-N(M)	25 ft	0.42	—	2.05

Devices

Description		Gain/Loss
Mini-Circuits ZFL-500HLN Amplifier		+ 20.7 dB (VHF)
Mini-Circuits ZFSC-2-1W Power Divider	Port 1	-3.24
	Port 2	-3.25
Mini-Circuits ZFSC-3-13 Power Divider	Port 1	-5.13
	Port 2	-5.12*
	Port 3	-5.13*
Mini-Circuits ZFSC-4-1 Power Divider	Port 3	-6.51
	Port 4	-6.52
EU147 Custom Amplifier		+ 32.3 (L-Band)
Mini-Circuits ZA3PD-2 Power Divider	Port 1	-4.87
	Port 2	-4.99
	Port 3	-5.04

* Provided for information only. Used to feed Delco and Ford FM receivers.